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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,274	03/10/2004	Paul Rich	WLJ.103	9386

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EXAMINER	
ESTRADA, MICHELLE	
ART UNIT	**PAPER NUMBER**
2823	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/796,274	RICH ET AL.	
	Examiner	Art Unit	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-7,9,10 and 13-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7,9,10,13-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, filed 2/28/07, with respect to the rejection(s) of claim(s) 1, 5 and 6 under Kado have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Le et al. (2003/0196890).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Le et al. (2003/0196890).

Re claim 1, Le et al. discloses a method of sputtering a tungsten film form a tungsten target onto a semiconductor wafer including using xenon as a sputter gas (Page 3, [0068]), wherein the resistivity of the tungsten film is less than 11μohm cm, the resistivity is an inherent property, since the same materials are treated in the same manner as the claim, then the resistivity recited would be obtained.

Re claim 9, Le et al. discloses wherein the sputter gases further include argon (Page 3, [0070]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3, 5, 6, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kado as applied to claims 1 and 9 above, and further in view of the following comments.

Re claims 2 and 3, Le et al. does not specifically disclose using krypton, Le et al. discloses using xenon as explained above in claim 1, but since they are both noble gases they are going to be utilized in the same manner and way, so it a matter of design choice to use either xenon or krypton in this case.

Re claims 2 and 3, 5, 6 and 10, One of ordinary skill in the art would have been led to the recited pressure, ratio of argon to xenon, power and temperature through routine experimentation to achieve a desired device dimension, device associated characteristics and device density on the finished wafer.

In addition, the selection of ratio of argon to xenon, pressure, power and temperature, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective

variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed ratio of pressure, argon to xenon, power and temperature or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen ratio of argon to xenon, pressure, power and temperature or upon another variable recited in a claim, the Applicant must show that the chosen ratio of argon to xenon, pressure, power and temperature are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Re claim 7, the Examiner takes official notice that using a negative DC bias during sputtering is well known at the time of the invention. It would have been within the scope of one of ordinary skill in the art at the time of the invention to use a negative DC bias power to enhance the quality of the film to be formed, in this case the tungsten film.

Claims 13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Le et al. as applied to claims 1 and 9 above, and further in view of Taguwa (6,800,543) in view of Matsumoto et al. (6,451,690).

Le does not disclose forming a tungsten/tungsten nitride stack on a wafer including sputtering tungsten nitride film on a wafer and sputtering a tungsten film on the tungsten nitride film wherein the two sputtering processes are performed in a single chamber using a single target.

Taguwa discloses a method of forming a tungsten/tungsten nitride (16/17) stack on a wafer including sputtering a tungsten nitride film (16) on a wafer and sputtering a tungsten film (17) on the tungsten nitride film (Col. 5, lines1-65); wherein the tungsten nitride film is deposited by reactive sputtering and the sputter gases include nitrogen (Col. 5, lines 20-32).

Taguwa does not specifically disclose wherein the two sputtering processes are performed in a single chamber using a single target.

Matsumoto et al. dislcose a method of forming metal film by sputtering method; wherein the metal films can be continuously formed by using the same target placed in the same chamber by merely changing the kind of gas to be used for the sputtering (Col. 5, lines 33-36).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Le et al., Taguwa and Matsumoto et al. to use the same target and chamber in the sputtering processes of Matsumoto et al. to be performed in the process

of Taguwa because using the same target placed in the same chamber improves the throughput.

Re claim 15, the combination of Le et al., Taguwa and Matsumoto et al. as explained above, forms a gate structure by the method of claim 13.

Re claim 16, Le et al. disclose wherein the resistivity of the tungsten film is less than 11μohm cm, the resistivity is a property, therefore since the same materials are treated in the same manner as the claim, then the resistivity recited would be obtained.

Claim 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Le et al. as applied to claims 1 and 9 above, and further in view of Taguwa (6,800,543) in view of Matsumoto et al. (6,451,690).

Le et al. does not specifically disclose using krypton, Le et al. discloses using xenon as explained above in claim 1, but since they are both noble gases they are going to be utilized in the same manner and way, so it a matter of design choice to use either xenon or krypton in this case.

With respect to claim 14, Taguwa discloses a method of forming a tungsten/tungsten nitride (16/17) stack on a wafer including sputtering a tungsten nitride film (16) on a wafer and sputtering a tungsten film (17) on the tungsten nitride film (Col. 5, lines1-65); wherein the tungsten nitride film is deposited by reactive sputtering and the sputter gases include nitrogen (Col. 5, lines 20-32).

Taguwa does not specifically disclose wherein the two sputtering processes are performed in a single chamber using a single target.

Matsumoto et al. dislcose a method of forming metal film by sputtering method; wherein the metal films can be continuously formed by using the same target placed in the same chamber by merely changing the kind of gas to be used for the sputtering (Col. 5, lines 33-36).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Le et al., Taguwa and Matsumoto et al. to use the same target and chamber in the sputtering processes of Matsumoto et al. to be performed in the process of Taguwa because using the same target placed in the same chamber improves the throughput.

Re claim 17, Le et al. disclose wherein the resistivity of the tungsten film is less than 11μohm cm, the resistivity is a property, therefore since the same materials are treated in the same manner as the claim, then the resistivity recited would be obtained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michelle Estrada
Primary Examiner
Art Unit 2823

ME
May 21, 2007